

### **Remarks/Arguments**

This Amendment responds to the Office Action mailed April 16, 2003 in the above-identified application. Based on the foregoing amendments and the following comments, reconsideration and allowance of the application are respectfully requested.

By this amendment, claims 77, 96, 139, 140, 141 and 147 have been amended. These amendments have been made to overcome certain formalities objections/rejections set forth in the Office Action. No new matter has been added.

As an initial matter, Applicants would like to thank the Examiner for the courtesies extended to Applicants' representative, M. Brad Lawrence, during a telephone conference conducted on July 14, 2003. During that telephone conference the differences between the teachings U.S. Patent No. 5,810,988 (Smith) and the pending claims was discussed. In particular, claim 77 was discussed and Applicants' representative explained that the step of exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface is directed to controlling the coalescence of the droplets rather than how the droplets are placed on the surface as is taught by Smith.

### **Rejections under 35 U.S.C. §112, second ¶**

In paragraph 1 of the Office Action, claims 77-147 were objected to/rejected under 35 U.S.C. ¶ 112, second paragraph. In response to these rejections applicant has amended each of the claims, except 97, that were specifically rejected or objected and believes that those claims are now free from defects.

With respect to claim 97, however, Applicant respectfully disagrees with the assertions in the Office Action. The Office Action asserts that alpha protons are not electromagnetic radiation. An alpha particle is made up of two protons and two neutrons with no electrons. Thus, it is positively charged. This positive charge falls within the definition of an electric charge (Chambers' 21<sup>st</sup> Century dictionary defines an electromagnetic wave as a traveling disturbance in space produced by the acceleration of an electric charge). Thus, the traveling positively charged particle (the alpha particle) is an electromagnetic wave. This definition is consistent with the wave-particle duality concept because visible light is a form a electromagnetic radiation and is made up of photons. These negatively charged photons are source of electric charge and, because they are moving, they are a form of electromagnetic

radiation. Alpha particles, like the photons in visible light, thus, can be electromagnetic radiation.

In view of the foregoing, Applicants respectfully request that the rejections/objections to claims 77-147 under 35 U.S.C. §112, second paragraph be withdrawn.

### **Claim Rejections Under 35 U.S.C. §§ 102, 103**

Claims 77-79, 81-85, 87-92, 95, 97, 109 112, 118-120, 122, 125, 128-130, 134, 136, 138-140 and 147 stand rejected under 35 U.S.C. §102(b) as anticipated by Smith (U.S. Patent No. 5,810,988). Claims 80, 86, 93-94, 96, 98-108, 110-111, 112-117, 121, 123-124, 126-127, 131-133, 135, 137 and 141-146 stand rejected under 35 U.S.C. §103(a) as unpatentable over Smith. Claims 97-104 and 143 also stand rejected under 35 U.S.C. § 103(a) as unpatentable over Smith in view of either Adler (EP 0 641 648 A1) or Hallman (EP 0 776 763 A1). Applicants respectfully traverse all of these rejections.

### **Claims 77-138**

Claim 77 is directed to a method of forming masking pattern on a surface. The method of claim 77 includes using drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to a surface to form a masking pattern. The droplets pass through an operating zone located between the deposition apparatus and the surface. The method also includes locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface, thereby controlling the solidity of the masking pattern.

The primary reference cited against claim 77 is Smith. Smith is directed to a system that creates and solidifies spherical droplets by freezing, evaporation or chemical reaction and maintain separated spherical droplets using electrostatics. Smith, however, fails to teach or suggest using electromagnetic radiation to control the coalescence of droplets. Firstly, Applicants respectfully assert that electrostatics and electromagnetic waves are, by definition different. That is, electromagnetic radiation is caused by the acceleration of an electric charge and electrostatics concerns electricity at rest. Thus, one of ordinary skill would not be motivated to use the electromagnetic radiation to control coalescence as recited in claim 77 based on Smith which teaches the use electrostatics.

Secondly, Smith does not teach or suggest (even if electrostatics may be considered electromagnetic radiation) using electromagnetic radiation to control coalescence of the droplets on the surface. Rather, Smith teaches solidification of droplets by freezing, evaporating or chemical reaction. (Col. 9, Line 10.) Solidification is not the same as coalescence and furthermore, is not carried out by electromagnetic radiation. The reason Smith does teach using electrostatic or electromagnetic fields (note: Applicant maintains that neither of these are electromagnetic radiation as recited in claim 77) is to direct droplets to targets by in-flight guidance forces. (Col. 3, line 64.) That is, Smith teaches using electrostatics to direct droplets, not to make them coalesce. Indeed, Smith actually teaches away from using electrostatics to control coalescence. In particular, at Col. 4, line 66, Smith teaches the use of a magnetic field to cause a liquid to break into droplets. Causing a liquid to break into droplets is nearly opposite of controlling the coalescence of the droplets as recited in claim 77.

Furthermore, Applicants do not observe, and the Office Action does not assert that any of the other cited references teach or suggest exposing the operating zone to electromagnetic radiation so as to control coalesce of droplets on a surface.

In view of the foregoing, Applicants respectfully assert that claim 77 is patentable over Smith alone or in combination with any of the cited references. Claims 78-138 depend from claim 77 and, therefore, are patentable for at least the same reasons.

#### Claim 139

Claim 139 is directed to a method of forming a spacer pattern on a surface. The method of claim 139 includes using drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to a surface to form a spacer pattern. In the method of claim 139, the droplets pass through an operating zone located between the deposition apparatus and the surface. The method of claim 139 also includes locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the surface, thereby controlling the solidity of the spacer pattern.

As discussed above with respect to claim 77, the cited references do not teach locally exposing the operating zone to electromagnetic radiation to control the coalescence of droplets on a surface. As such, Applicants respectfully assert that claim 139 is patentable over the cited references

Claim 140

Claim 140 is directed to a method of forming a circuit pattern on a circuit board. The method includes using drop-on-demand printing to deposit from a droplet deposition apparatus a plurality of droplets on to said circuit board to at least partially fill via holes formed in the circuit board, said droplets passing through an operating zone located between the deposition apparatus and the surface. The method also includes locally exposing the operating zone to electromagnetic radiation so as to control coalescence of the droplets on the circuit board.

As discussed above with respect to claim 77, the cited references do not teach locally exposing the operating zone to electromagnetic radiation to control the coalescence of droplets. As such, Applicants respectfully assert that claim 140 is patentable over the cited references.

Claims 141-146

Claim 141 is directed to a method of forming a relief pattern on a surface. The method includes, *inter alia*, locally exposing an operating zone to electromagnetic radiation so as to control coalescence of the droplets on the charged portions of a roller.

As discussed above with respect to claim 77, the cited references do not teach locally exposing the operating zone to electromagnetic radiation to control the coalescence of droplets. As such, Applicants respectfully assert that claim 141 is patentable over the cited references. Claims 142-146 depend from claim 141 and, thus, are also patentable over the cited references.

Claim 147

Claim 147 is directed to a droplet deposition apparatus. This apparatus includes a deposition chamber for housing deposition material, an outlet nozzle in fluid communication with said deposition chamber, means for ejecting droplets of deposition material on demand from said deposition chamber through said outlet nozzle on to a surface, means for defining an operating zone through which droplets pass between the outlet nozzle and the surface, and means for locally exposing the operating zone to electromagnetic radiation so as to control coalescence of droplets on the surface.

As discussed above with respect to claim 77, the cited references do not teach locally exposing the operating zone to electromagnetic radiation to control the coalescence of droplets. As such, the cited references do not teach means for locally exposing the operating zone to

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electromagnetic radiation so as to control coalescence of droplets on the surface as recited in claim 147. Thus, Applicants respectfully assert that claim 147 is patentable over the cited references.

### **CONCLUSION**

In view of the foregoing amendments and remarks, this application should now be in condition for allowance. A notice to this effect is respectfully requested. If the Examiner believes, after this amendment, that the application is not in condition for allowance, the Examiner is requested to call the Applicant's attorney at the telephone number listed below.

If this response is not considered timely filed and if a request for an extension of time is otherwise absent, Applicant hereby requests any necessary extension of time. If a fee is occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 23/2825.

Respectfully submitted,

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